#### Spring 2021

## **CSE 190** VR Technologies

#### **Discussion 4**





#### ANNOUNCEMENTS

- Homework 2 Released
  - Due Sunday (5/2)
  - VR Headset Required
  - Expect some minor updates on the specs page
- SAVE OFTEN





#### AGENDA

• Setting up Unity & Oculus Quest 2 for VR Support

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• Build Virtual 3D Scene



## SETTING UP UNITY & OCULUS QUEST



#### Setting Up Unity & Oculus Quest

- A little bit laborious, make sure follow all steps
- Ingredients
  - System: macOS/Windows 10/Linux
  - Unity ver. 2020.3.5f1
  - VR Headset (this discussion is mainly focused on Oculus Quest 2 development)
  - Cross-Platform:

https://developer.oculus.com/documentation/unity/ unity-cross-platform-dev/



#### Setting Up - Install SDKs

- Install Latest Version of Unity, Android SDK and JDK via Unity Hub
- Oculus Quest 2's OS is Android-Based



Unity Hub Install New Components

### Setting Up - Install SDKs

-	<u> </u>	Unity Hub 2.	410	
🚭 unity				
		Add Unity Version		×
	Projects			
▶	Learn	Select a version of Unity	2 Add modules to your insta	all and a second se
	Community	Can't find the version you're looking for? Visit our do support and patch releases, or join our Open Beta pro	wnload archive for access to long-term ogram releases.	n (
		Recommended Release		
	Installs	O Unity 2020.3.5f1 (LTS)		
		Official Releases		
		O Unity 2021.1.4f1		
		Onity 2019.4.25f1 (LTS)		
		O Unity 2018.4.34f1 (LTS)		
		Pre-Releases		
		-		_
		CANCEL	BACK N	EXT



### Setting Up - Create Unity Project for VR

•••	с	reate a new project with	Unity 2020.3.5f1
Templates			Settings
() 2D	() () 3D	i High Definition RP	Project Name * Assignment Location * /Users/framiere/Documents/Documents - Su •••
	± ⊕	±	
Universal Render Pipeline	FPS Microgame	Karting Microgame	
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2D Platformer Microgame	HD Sample Auto Showroom	Mobile 2D	
±	* Ø	÷	
Mobile 3D	AR	VR	
			CANCEL

#### Setting Up - Enable Developer Mode for VR



### Setting Up - Unity Install Oculus Integration

- Oculus Integration: SDK for Unity provides support to develop Oculus apps in Unity
  - Handles headset tracking, controller tracking and so much more
- Installed from Unity Assets Store:

https://assetstore.unity.com

Version 27

- Import to your newly created project
- SAVE OFTEN



https://developer.oculus.com/downloads/package/unity-integration/

#### **Setting Up - Unity Install Oculus Integration**



Select all the components and import to your project

#### **Setting Up - Configure Build Settings**

- File -> Build Settings -> Run Device
- Select your Oculus Quest (or other VR)
  - Make sure you installed Android SDK and JDK prior this step, otherwise Unity will complain it cannot find the SDKs
- SAVE OFTEN

• • •	Build Settin	ngs	
Build Settings			
Scenes In Build			
			Add Open Scenes
Platform			
PC, Mac & Linux Standalone	🗰 Android		
📺 Android 🛛 🍕		Don't override	
1.00 tu00		32-bit	
	Symlink Sources		
:00 :00	Create symbols zin		
105 105	Run Device	Oculus Quest 2 (1WMHH837PJ0515	5) 🔻 Refresh
<b>5</b>			
Xbox Une			
WebGL			
<b>u</b>			
Player Settings			Build Build And Run

#### **Setting Up - Configure Build Settings**

#### • Select the correct graphics API

		Project Set	ttings		
🌣 Project Settings					
Adaptive Performance Audio	Player				0 ≄ ¢
			DefaultCompany		
Graphics			Assignment 2		
Package Manager					
Physics Physics 2D					None (Texture 2D)
Player					
Preset Manager Quality					Select
Scene Template Script Execution Order					None (Texture 2D)
					Select
Ads Analytics Cloud Build			x 0	Υ 0	
Cloud Diagnostics				•	
Collaborate	Settings for Android				
Tags and Layers					
TextMesh Pro Time	► Resolution and Prese	ntation			
Timeline Version Control	▶ Splash Image				
XR Plug-in Management Ooulus	► Other Settings				
	▶ Publishing Settings				

▼ Other Settings	
Rendering	
Color Space*	Gamma 🔻
Auto Graphics API	
Graphics APIs	
- OpenGLES3	
	+
Require ES3.1	
Require ES3.1+AEP	
Require ES3.2	

By default, the options here are Vulkan and OpenGL, make sure you drag OpenGL to the top (if Vulkan is present)

#### **Setting Up - Configure Build Settings**

- Enable Oculus Plug-in
- Black screen if missed this step

•••	Project Settings	
🌣 Project Settings		
Adaptive Performance Audio Editor	XR Plug-in Management	
Graphics	₽	
Input Manager Package Manager	Initialize XR on Startup 🗸	
Physics Physics 2D	Plug-in Providers 🕑	
Player	ARCore	
Preset Manager	✓ Oculus	
Quality Scene Template	Unity Mock HMD	
Script Execution Order		
▼ Services Ads		
Analytics	Information about configuration, tracking and migration can be found below.	
Cloud Build		
Collaborate		
In-App Purchasing		
Tags and Layers TextMesh Pro		
Timeline		
XR Plug-in Management		
Oculus		

#### **Setting Up - Test**

- All those scenes should be able to be compiled and run on your headset
- If you encounter black screen issue, make sure to check XR Plugin Management is checked for Oculus
- SAVE OFTEN



## Setup Complete!

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# BUILD VIRTUAL 3D SCENE



#### **Build Virtual 3D Scene**

- The Oculus Integration package adds scripts, prefabs, samples, and other resources to supplement Unity's built-in support.
- The package includes an interface for controlling VR camera behavior, a first-person control prefab, a unified input API for controllers, rendering features, debugging tools, and more
- SAVE OFTEN



### **Oculus Integration (OI) Components**

#### • OVRCameraRig

- Prefab, provides the transform object to represent the Oculus tracking space.
- Obtain headset physical poses, apply the value to the virtual camera
- OVRPlayerController
  - Contains a camera rig and a local avatar
- OVRHandPrefab
  - Enables hand tracking in Oculus Quest, can control user interface with bare hands
- LocalAvatar
  - $\circ$  Prefab, "you" in the virtual world, can see your own hands in game

Select necessary components and add it to the scene hierarchy

OVRPlayerController
 ForwardDirection
 OVRCameraRig
 TrackingSpace
 LocalAvatar
 LeftEyeAnchor
 RightEyeAnchor
 TrackerAnchor
 LeftHandAnchor
 RightHandAnchor
 RightHandAnchor

### **Oculus Integration (OI) Components**

• Use the search bar to find necessary components needed for the project



#### **Build Virtual 3D Scene - Skybox**

- A Skybox is a 6-sided cube that is drawn behind all graphics in the game.
- Used as 360 degree background
- Create new Material Asset -> Skybox

<ul> <li>Inspector</li> </ul>			
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O Height M	Oculus Sample	ś	
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	OvrAvatar	>	
	Skybox	्	
	O NY DOA	Ś	
Offset	Unlit		
Secondary N	Autodesk Interactive OVRColorRampAlpa		•





#### **Build Virtual 3D Scene - Scene Switch**

- Unity provides mechanisms for switching scenes in script
- Suitable for this project as you are asked to create several virtual scenes for measurement
- Procedure:
  - Have multiple scenes readily available
  - Make a GameObject to be the trigger for the scene switch
  - Attach a C# script to the object
  - using UnityEngine.SceneManagement
  - SceneManager.LoadScene(sceneName);
- Add all the scenes to the build phase

•••	Build Settings	
Build Settings		
Scenes In Build		
<ul> <li>Scenes/Focus</li> </ul>		
<ul> <li>Scenes/FOV</li> </ul>		
		Add Open Scenes



#### **Useful APIs**

: API Package that provides raw input from the tracked controllers

Controller Tracking: OVRInput https://developer.oculus.com/reference/unity/v27/class\_o\_v\_r\_input

Following APIs provides the position and rotation of the controllers in tracking space

- OVRInput.GetLocalControllerPosition( OVRInput.Controller controllerType )
- GetLocalControllerRotation ( OVRInput.Controller controllerType )

#### Headset Tracking: OVRCameraRig https://developer.oculus.com/reference/unity/v27/class\_o\_v

- OVRCameraRig overCameraRig; //Obtain this using GetComponent var position = overCameraRig.centerEyeAnchor.position;
- centerEye, leftEye, rightEye for different purposes

# **GOOD LUCK!**

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# **QUESTIONS?**

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